

Claims

WHAT IS CLAIMED IS:

1. A method for producing stable cell lines of mammalian neural precursor cells *in vitro*, comprising the steps of:

- a) preparing a culture of neural precursor cells in a serum-free medium;
- b) culturing the neural precursor cells in the presence of a first mitogen, wherein

Sub a' said first mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGF α and combinations thereof;

c) contacting the cells with an agent capable of being taken up by the cells and capable of expressing a c-myc gene; and

d) further culturing the cells in a medium containing the first mitogen and a second mitogen, wherein said second mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGF α , serum and combinations thereof, with the proviso that the second mitogen is other than the first mitogen.

2. The method of claim 1, wherein the c-myc gene is fused with other DNA elements, wherein said other DNA elements comprise at least one element selected from the group consisting of a ligand binding domain for an estrogen receptor, an androgen receptor, a progesterone receptor, a glucocorticoid receptor, a thyroid hormone receptor, a retinoid receptor, and an ecdysone receptor.

3. The method of claim 1, wherein said medium containing the first mitogen and the second mitogen further comprises a myc-activating chemical selected from the group consisting of β -estradiol, RU38486, dexamethasone, thyroid hormones, retinoids, and ecdysone.

4. The method of claim 1, wherein the mammalian neural precursor cells are derived from a human.

5. The method of claim 1, wherein the mammalian neural precursor cells are derived from an *in vitro* culture of pluripotent embryonic stem cells.

6. A cell line produced according to the method of claim 1.

7. The cell line of claim 6, wherein the cells maintain a multipotential capacity to differentiate into neurons, astrocytes and oligodendrocytes.

8. The cell line of claim 6, wherein the cells maintain a bipotential capacity to differentiate into neurons and astrocytes.

9. The cell line of claim 6, wherein the cells maintain a bipotential capacity to differentiate into astrocytes and oligodendrocytes.

10. The cell line of claim 6, wherein the cells maintain a unipotential capacity to differentiate into neurons.

11. The cell line of claim 6, wherein the cells maintain a unipotential capacity to differentiate into astrocytes.

12. A method for producing stable clonal cell lines of mammalian neural precursor cells *in vitro*, comprising the steps of:

- a) preparing a culture of neural precursor cells in a serum-free medium;
- b) culturing the neural precursor cells in the presence of a first mitogen, wherein said first mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGF α and combinations thereof;
- c) contacting the cells with an agent capable of being taken up by the cells and capable of expressing a c-myc gene and a selectable marker;
- d) further culturing the cells in a medium containing the first mitogen and a second mitogen, wherein said second mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGF α , serum and combinations thereof, with the proviso that the second mitogen is other than the first mitogen; and
- e) collecting c-myc treated cells and co-culturing them with feeder cells free of the selectable marker and capable of supporting survival of the c-myc treated cells in a medium containing the first mitogen and the second mitogen, with the proviso that the second mitogen is other than the first mitogen.

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13. The method of claim 12, wherein the c-myc gene is fused with other DNA elements, wherein said other DNA elements comprise at least one element selected from the group consisting of a ligand binding domain for an estrogen receptor, an androgen receptor, a progesterone receptor, a glucocorticoid receptor, a thyroid hormone receptor, a retinoid receptor, and an ecdysone receptor.

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14. The method of claim 12, wherein said medium containing the first mitogen and the second mitogen further comprises a myc-activating chemical selected from the group consisting of β -estradiol, RU38486, dexamethasone, thyroid hormones, retinoids, and ecdysone.

15. The method of claim 12, wherein the mammalian neural precursor cells are derived from a human.

16. The method of claim 12, wherein the mammalian neural precursor cells are derived from an *in vitro* culture of pluripotent embryonic stem cells.

17. A cell line produced according to the method of claim 12.

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18. The cell line of claim 17, wherein the cells maintain a multipotential capacity to differentiate into neurons, astrocytes and oligodendrocytes.

19. The cell line of claim 17, wherein the cells maintain a bipotential capacity to differentiate into neurons and astrocytes.

20. The cell line of claim 17, wherein the cells maintain a bipotential capacity to differentiate into astrocytes and oligodendrocytes.

21. The cell line of claim 17, wherein the cells maintain a unipotential capacity to differentiate into neurons.

22. The cell line of claim 17, wherein the cells maintain a unipotential capacity to differentiate into astrocytes.